

## AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

### **LISTING OF CLAIMS**

1-11. (cancelled)

12. (currently amended) ~~An orthopedic preformed material~~ An ultra high molecular weight polyethylene molded article for subsequent production of a medical implant with improved wear resistance, said preformed material is a — article comprising an ultra high molecular weight polyethylene crosslinked by irradiation, and thermally treated according to the method selected from the group consisting of: annealing and remelting then heated at a temperature from its melting point minus 50°C to its melting point plus 80°C.

13. (currently amended) ~~The orthopedic preformed material~~ molded article of Claim 12, wherein said ~~preformed material~~ polyethylene is crosslinked by gamma radiation at a dose from about 1 to about 5 MR.

14. (currently amended) ~~The orthopedic material~~ molded article of Claim 12, wherein said ~~thermal treatment is remelting heating~~ is at a temperature of from the melting point of the ultra high molecular weight polyethylene to 80°C above said melting point.

15. (currently amended) ~~The orthopedic material~~ molded article of Claim 12, wherein said ~~thermal treatment heating is at a temperature from 50°C below the melting point of the polyethylene to said melting point~~ annealing.

16. (cancelled)

17. (currently amended) ~~A medical implant having a bearing surface~~ An artificial joint, with improved wear resistance, said bearing surface comprising a solid ultra high molecular weight polyethylene which has been previously crosslinked by irradiation and subsequently

~~remelted~~ then heated to a temperature from the melting point of the ultra high molecular weight polyethylene to 80°C above said melting point.

18. (cancelled)

19. (currently amended) The ~~medical implant~~ artificial joint of Claim ~~18~~ 17, wherein said polyethylene is crosslinked by gamma irradiation at a dose of at least ~~about~~ 1 MR.

20. (currently amended) The ~~medical implant~~ artificial joint of Claim 19, wherein said polyethylene is crosslinked by gamma radiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

21. (cancelled)

22. (currently amended) The ~~medical implant~~ artificial joint of Claim 17, wherein a ~~layer of the crosslinked and remelted~~ said crosslinked and heated polyethylene is ~~removed~~ cut during processing into an implant.

23. (currently amended) The ~~medical implant~~ artificial joint of Claim 17, wherein said ~~implant is a component for use in a joint prosthesis~~ artificial joint is an artificial hip joint or an artificial knee joint.

24. (currently amended) The ~~medical implant~~ artificial joint of Claim 23, ~~wherein said component is a bearing component~~ comprising an acetabular cup or a tibial insert.

25. (cancelled)

26. (currently amended) The ~~medical implant~~ artificial joint of Claim ~~25~~ 24, ~~wherein the implant is~~ comprising an acetabular cup.

27. (currently amended) ~~A medical implant having a bearing surface~~ An artificial joint with improved wear resistance, ~~said bearing surface~~ comprising a solid ultra high molecular

weight polyethylene which has been previously crosslinked by irradiation and subsequently annealed then heated at a temperature from its melting point minus 50°C to said melting point.

28. (cancelled)

29. (currently amended) A medical implant of Claim 27, wherein said polyethylene has previously been crosslinked by irradiation and subsequently isothermally treated at a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of time from ~~about~~ 1 hour to ~~about~~ 20 hours.

30. (cancelled)

31. (currently amended) ~~The medical implant~~ An artificial joint of Claim 27, wherein said polyethylene is crosslinked by gamma radiation at a dose of at least about 1MR.

32. (currently amended) ~~The medical implant~~ An artificial joint of Claim 31, wherein said polyethylene is crosslinked by gamma radiation at a dose of from ~~about 1~~ to ~~about 5~~ MR.

33. (currently amended) ~~The medical implant~~ An artificial joint of Claim 27, wherein ~~a layer of the crosslinked and annealed~~ said crosslinked and heated polyethylene is ~~removed~~ cut during processing into an implant.

34. (currently amended) ~~The medical implant~~ artificial joint of Claim 27, wherein ~~said implant is comprising~~ a component for use in a joint prosthesis hip joint or a knee joint.

35. (cancelled)

36. (currently amended) ~~The medical implant~~ artificial joint of Claim ~~35~~ 27, wherein said ~~joint prosthesis~~ artificial joint is selected from the group consisting of: hip and knee joints ~~prostheses.~~

37. (currently amended) The ~~medical implant artificial joint~~ of Claim 36, wherein the ~~implant is comprising~~ an acetabular cup.

38. (currently amended) A method for increasing the wear resistance of a ~~preformed~~ ultra high molecular weight polyethylene comprising the steps of:

- (a) crosslinking said ultra high molecular weight polyethylene by irradiating it ~~in a solid state~~ below its melting point; and then
- (b) ~~subjecting—~~heating the crosslinked ultra high molecular weight polyethylene ~~to thermal treatment which is selected from the group consisting of: annealing and remelting at a temperature from its melting point minus 50°C to said melting point plus 80°C.~~

39. (previously presented) The method of Claim 38, wherein said crosslinking is by gamma irradiation.

40. (currently amended) The method of Claim 39, wherein the gamma irradiation is at a dose of at least ~~about~~ 1 MR.

41. (currently amended) The method of Claim 40, wherein the gamma irradiation is at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

42. (cancelled)

43. (currently amended) The method of Claim 38, wherein said thermal treatment comprises heating said polyethylene to a temperature between ~~about~~ 50° C below the melting temperature of said irradiated preformed ~~polymer—polyethylene~~ and ~~about~~ the melting temperature of said irradiated preformed polyethylene.

44. (currently amended) The method of Claim 38, ~~wherein said thermal treatment comprises additionally comprising~~ heating said polyethylene to a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

45. (cancelled)

46. (currently amended) A method for increasing the wear resistance of an ~~orthopedic preformed polyethylene polymer~~ ultra high molecular weight polyethylene molded article, comprising the steps of:

- (a) ~~crosslinking the preformed polyethylene polymer said article by irradiating it in a solid state below its melting point; then~~
- (b) ~~subjecting heating the crosslinked preformed polymer to thermal treatment which is selected from the group consisting of: annealing and remelting article at a temperature from its melting point minus 50°C to its melting point plus 80°C; and then~~
- (c) ~~removing the surface of the thermally treated crosslinked preformed polymer wherein said polymer is polyethylene cutting the heated, crosslinked article.~~

47. (cancelled)

48. (currently amended) The method of Claim 46, wherein said ~~polyethylene~~ article is crosslinked by gamma radiation at a dose of at least ~~about~~ 1 MR.

49. (currently amended) The method of Claim 48, wherein said ~~polyethylene~~ article is crosslinked by gamma radiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

50. (currently amended) The method of Claim 46, wherein said ~~polyethylene~~ article is ~~remelted~~ at a temperature from the melting temperature of the irradiated polyethylene to ~~about~~ 80° C above the melting temperature of said irradiated polyethylene.

51. (currently amended) The method of Claim 46, wherein said ~~polyethylene~~ article is heated to a temperature between ~~about~~ 50° C below the melting temperature of said irradiated

~~preformed polyethylene article below~~ and the melting temperature of said irradiated ~~preformed polyethylene article~~.

52. (currently amended) The method of Claim 46, wherein said ~~thermal treatment heating~~ comprises heating said ~~polyethylene article~~ to a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

53. (currently amended) A method for increasing the wear resistance of an ~~preformed polymer~~ ultra high molecular weight molded article, comprising the steps of:

- (a) crosslinking said ~~preformed polymer article~~ by irradiating it ~~in its solid state below its melting point; and then~~
- (b) ~~remelting heating~~ said crosslinked ~~polymer, said polymer being~~ polyethylene article at a temperature from its melting point to its melting point plus 80°C.

54. (cancelled)

55. (cancelled)

56. (currently amended) The method of Claim 53, wherein the ~~preformed polymer article~~ is crosslinked by gamma radiation at a dose of at least ~~about~~ 1 MR.

57. (currently amended) The method of Claim 56, wherein the ~~preformed polymer article~~ is crosslinked by gamma radiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

58. (currently amended) ~~A preformed polyethylene~~ An ultra high molecular weight polyethylene molded article made according to a method comprising the steps of:

- (a) crosslinking a starting ultra high molecular weight polyethylene by irradiating it ~~in a solid state below its melting point~~ to form a crosslinked ultra high molecular weight polyethylene; and then

(b) ~~subjecting—~~heating the crosslinked ultra high molecular weight polyethylene at a temperature from its melting point minus 50°C to its melting point plus 80°C; ~~to thermal treatment which is selected from the group consisting of: annealing and remelting;~~  
wherein said ~~preformed polyethylene article~~ has improved wear resistance over untreated ultra high molecular weight polyethylene.

59. (currently amended) The ~~preformed polyethylene article~~ of Claim 58, wherein said crosslinking is by gamma irradiation.

60. (currently amended) The ~~preformed polyethylene article~~ of Claim 59, wherein said gamma irradiation is at a dose of ~~from~~ at least ~~about~~ 1 MR.

61. (currently amended) The ~~preformed polyethylene article~~ of Claim 60, wherein said gamma irradiation is at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

62. (cancelled)

63. (currently amended) The ~~preformed polyethylene article~~ of Claim 58, wherein said ~~thermal treatment~~ heating comprises heating said crosslinked polyethylene to a temperature between ~~about~~ 50° C below the melting point of said irradiated polyethylene and the melting temperature of said irradiated polyethylene.

64. (currently amended) The ~~preformed polyethylene article~~ of Claim 58, wherein ~~whenever said thermal treatment~~ heating additionally comprises heating said polyethylene to a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

65. (cancelled)

66. (currently amended) ~~A preformed polyethylene polymer~~ An ultra high molecular weight molded article made according to a method comprising the steps of:

- (a) crosslinking a starting ultra high molecular weight polyethylene polymer by irradiating in the presence of oxygen ~~in a solid state~~ to form a crosslinked polymer;
- (b) ~~subjecting heating~~ said crosslinked polymer to a temperature from 50°C below the melting point of the polyethylene to 80°C above said melting point ~~thermal treatment selected from the group consisting of: annealing and remelting the crosslinked polymer;~~ and
- (c) ~~removing the oxidized surface of~~ cutting the heated crosslinked polymer.

67. (cancelled)

68. (currently amended) The ~~preformed polymer molded article~~ of Claim ~~67~~ 66, wherein said crosslinking is by gamma irradiation at a dose of at least ~~about~~ 1 MR.

69. (currently amended) The ~~preformed polymer molded article~~ of Claim 68, wherein said crosslinking is by gamma irradiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

70. (currently amended) ~~A preformed polymer~~ An ultra high molecular weight polyethylene article made according to the method comprising the steps of:

- (a) crosslinking a starting ultra high molecular polyethylene polymer by irradiating it ~~in a solid state below its melting point~~ to form a crosslinked ultra high molecular weight polyethylene polymer; and then
- (b) ~~remelting heating~~ the crosslinked polymer, wherein ~~said polymer is polyethylene~~ at a temperature from its melting point to its melting point plus 80°C.

71. (cancelled)

72. (cancelled)



73. (currently amended) The ~~preformed polymer molded article~~ of Claim 70, wherein said crosslinking is by gamma irradiation at a dose of at least ~~about~~ 1 MR.

74. (currently amended) The ~~preformed polymer molded article~~ of Claim 73 wherein said crosslinking is by gamma irradiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

75. (currently amended) An ~~implantable load bearing component artificial joint component~~ made by the process comprising the steps of:

- (a) crosslinking a ~~preformed~~ an ultra high molecular weight polyethylene below its melting point in its solid state; then
- (b) ~~subjecting heating~~ the crosslinked polyethylene to a temperature from its melting point minus 50°C to its melting point plus 80°C ~~thermal treatment selected from the group consisting of: annealing and remelting; and then~~
- (c) ~~fashioning processing~~ the implantable bearing component from the crosslinked and thermally treated polyethylene to make an artificial joint component.

76. (cancelled)

77. (currently amended) The ~~implantable bearing component~~ of Claim 75, wherein said polyethylene is crosslinked by gamma radiation at a dose of at least ~~about~~ 1 MR.

78. (currently amended) The ~~implantable bearing component~~ of Claim 77, wherein said polyethylene is crosslinked by gamma radiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

79. (currently amended) The ~~implantable bearing component~~ of Claim 75, wherein said heating is at a temperature from said melting to 80°C above said melting point ~~thermal treatment is remelting.~~

80. (currently amended) The ~~implantable bearing~~ component of Claim 75, wherein said polyethylene is heated to a temperature between ~~about~~ 50° C below the melting temperature of said irradiated ~~preformed~~ polyethylene below and the melting temperature of said irradiated ~~preformed~~ polyethylene.

81. (cancelled)

82. (cancelled)

83. (previously presented) The ~~implantable bearing~~ component of Claim ~~82~~ 75, wherein said ~~joint prosthesis~~ artificial joint is selected from the group consisting of: hip and knee joint prostheses.

84. (currently amended) The ~~implantable bearing~~ component of Claim 83, wherein ~~the implantable bearing~~ said component is an acetabular cup.

85. (currently amended) ~~A product~~ An artificial joint component made by the process comprising the steps of:

- (a) ~~crosslinking a preformed polymer~~ an ultra high molecular weight polyethylene by irradiating it in a solid state; then
- (b) ~~subjecting the crosslinked polymer to thermal treatment selected from the group consisting of: annealing and remelting~~ heating said polyethylene to a temperature from around 100°C to 130°C for a period of from 1 hour to 20 hours; and then
- (c) ~~removing the oxidized surface of the crosslinked polymer; and~~
- (d) ~~fashioning the product from processing the crosslinked and thermally treated polymer; wherein said polymer polyethylene~~ to make an artificial joint component.

86. (cancelled)

87. (currently amended) The ~~product-component~~ of Claim 85, wherein said ~~polymer polyethylene~~ is crosslinked by gamma radiation at a dose of at least ~~about~~ 1 MR.

88. (currently amended) The ~~product-component~~ of Claim 87, wherein said ~~polymer polyethylene~~ is crosslinked by gamma radiation at a dose of from ~~about~~ 1 to ~~about~~ 5 MR.

89. – 103. (cancelled)

104. (currently amended) A method for making an ultra high molecular weight polyethylene (UHMWPE) article, for subsequent processing to make an artificial joint ~~a medical implant~~, comprising:

- (a) irradiating a raw article comprising UHMWPE; and then
- (b) heating said irradiated article to a temperature of from ~~about~~ 50° C below the melting point of said article to ~~about~~ 80° C above said melting point.

105. (currently amended) A method according to Claim 104, wherein said heating is at a temperature between ~~about~~ 50° C below the melting point of said article and said melting point.

106. (currently amended) A method according to Claim 105, wherein said heating is at a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

107. (currently amended) A method according to Claim 104, wherein said heating is at a temperature from ~~about~~ said melting point to ~~about~~ 80° C above said melting point.

108. (previously presented) A method according to Claim 104, wherein said temperature is a compression deformable temperature.

109. (previously presented) A method according to Claim 108, wherein pressure is applied during said heating step.

110. (currently amended) A method according to Claim 109, ~~wherein said article is further comprising cooling said article and isothermally heated-crystallizing said cooled article~~ after said ~~pressure is applied~~ heating step.

111. (currently amended) A method according to Claim 110, wherein said isothermal ~~treatment~~ crystallizing comprises heating said article to a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

112. (previously presented) An ultra high molecular weight polyethylene article made by the process of Claim 104.

113. (currently amended) An article according to Claim 112 having a wear factor of less than ~~about~~  $9.6 \times 10^{-7}$ .

114. (currently amended) A method for making an ultra high molecular weight polyethylene (UHMWPE) article which is suitable for subsequent processing to make an artificial joint ~~a medical implant~~, so as to improve the wear resistance properties of said article, comprising:

- (a) irradiating a raw article comprising UHMWPE; and then
- (b) heating said irradiated article to a temperature of from ~~about~~ 50° C below the melting point of said article to ~~about~~ 80° C above said melting point.

115. (currently amended) A method according to Claim 114, wherein said heating is at a temperature between ~~about~~ 50° C below the melting point of said article and said melting point.

116. (currently amended) A method according to Claim 115, ~~wherein said heating is additionally comprising heating said irradiated article~~ at a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

117. (currently amended) A method according to Claim 114, wherein said heating is at a temperature from ~~about~~ said melting point to ~~about~~ 80° C above said melting point.

118. (previously presented) A method according to Claim 114, wherein said temperature is a compression deformable temperature.

119. (previously presented) A method according to Claim 118, wherein pressure is applied during said heating step.

120. (previously presented) An UHMWPE article made by a process of Claim 114.

121. (currently amended) An UHMWPE article according to Claim 120 having a wear factor of less than ~~about~~  $9.6 \times 10^{-7}$ .

122. (currently amended) A method of making a component for an artificial joint comprising ultra high molecular weight polyethylene (UHMWPE), comprising:

- (a) irradiating a raw article comprising UHMWPE;
- (b) heating said irradiated article to a temperature of from ~~about~~ 50° C below the melting point of said article to ~~about~~ 80° C above said melting point; and then
- (c) processing said article to make said component.

123. (currently amended) A method according to Claim 122, wherein said heating is at a temperature between ~~about~~ 50° C below the melting point of said article and said melting point.

124. (currently amended) A method according to Claim 123, ~~wherein said heating is additionally comprising heating said irradiated article~~ at a temperature of from ~~about~~ around 100°C to ~~about~~ 130°C for a period of from ~~about~~ 1 hour to ~~about~~ 20 hours.

125. (currently amended) A method according to Claim 122, wherein said heating is at a temperature from ~~about~~ said melting point to ~~about~~ 80° C above said melting point.

126. (previously presented) A method according to Claim 122, wherein said temperature is a compression deformable temperature.

127. (previously presented) A method according to Claim 126, wherein pressure is applied during said heating step.

128. (previously presented) A component for an artificial joint, wherein said component is made by a process according to Claim 122.

129. (currently amended) A component for an artificial joint according to Claim 128, having a wear factor of less than ~~about~~  $9.6 \times 10^{-7}$ .

130. (currently amended) A method for making an ultra high molecular weight polyethylene (UHMWPE) article, for subsequent processing to make an artificial joint ~~a medical implant~~, comprising:

- (a) irradiating a raw article comprising UHMWPE; and then
- (b) heating said irradiated article to a temperature of from ~~about~~ around  $100^{\circ}$  C to ~~about~~  $130^{\circ}$  C for a period of at least ~~about~~ 1 hour.

131. (currently amended) A method according to Claim 130, wherein said heating step comprises heating said article for from ~~about~~ 1 hour to ~~about~~ 20 hours.

132. (previously presented) A method according to Claim 130, wherein said article is cooled at a constant rate after said heating step.

133. (currently amended) A method according to Claim 132, wherein said cooling is at a rate of ~~about~~  $1^{\circ}$  C/minute.

134. (previously presented) A method according to Claim 130, additionally comprising a step, prior to said heating step, comprising applying pressure to said irradiated article at a deformation temperature.

135. (currently amended) A method according to Claim 134, wherein said deformation temperature is between ~~about~~ 50° C below the melting point of said article and said melting point.

136. (currently amended) A method according to Claim 134, wherein said deformation temperature is from ~~about~~ said melting point to ~~about~~ 80° C above said melting point.

137. (previously presented) A UHMWPE article made by a process according to Claim 130.

138. (currently amended) A UHMWPE article according to Claim 137 having a wear factor of less than ~~about~~  $9.6 \times 10^{-7}$ .

139. (currently amended) A method of making a component for an artificial joint comprising ultra high molecular weight polyethylene (UHMWPE), comprising:

- (a) irradiating a raw article comprising UHMWPE; and then
- (b) heating said irradiated article to a temperature of from ~~about~~ around 100° C to ~~about~~ 130° C for a period of at least ~~about~~ 1 hour; and then
- (c) processing said article to make said component.

140. (currently amended) A method according to Claim 139, wherein said heating step comprises heating said article for from ~~about~~ 1 hour to ~~about~~ 20 hours.

141. (previously presented) A method according to Claim 139, wherein said article is cooled at a constant rate after said heating step.

142. (currently amended) A method according to Claim 141, wherein said cooling is at a rate of ~~about~~ 1° C/minute.

143. (previously presented) A method according to Claim 139, additionally comprising a step, prior to said heating step, comprising applying pressure to said irradiated article at a deformation temperature.

144. (currently amended) A method according to Claim 143, wherein said deformation temperature is between ~~about~~ 50° C below the melting point of said article and said melting point.

145. (currently amended) A method according to Claim 143, wherein said deformation temperature is from ~~about~~ said melting point to ~~about~~ 80° C above said melting point.

146. (previously presented) A component for a medical implant made by a process according to Claim 139.

147. (previously presented) A component for a joint prosthetic device according to Claim 146.

148. (currently amended) A component for an artificial joint according to Claim 146 having a wear factor of less than ~~about~~  $9.6 \times 10^{-7}$ .